

# Travel Time Reliability

## Definitions and Estimation Methods



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# Presentation Overview

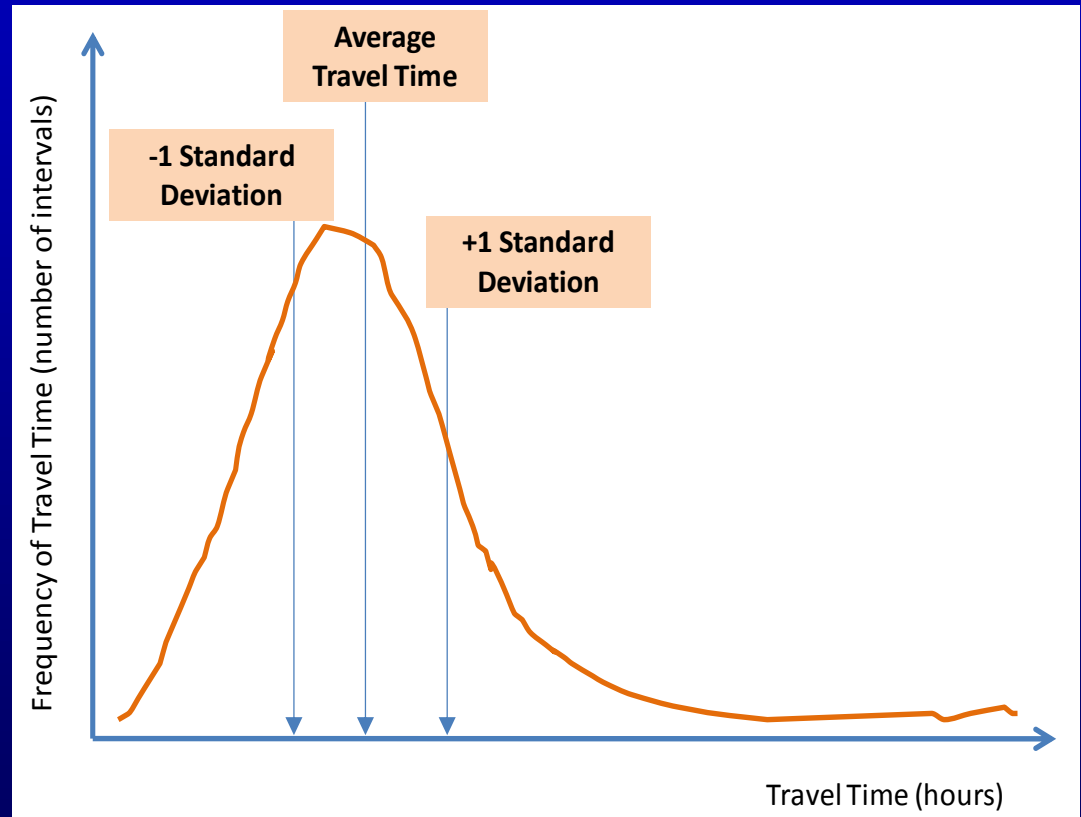
- What is travel time reliability (TTR) and why is it useful in practice?
- Overview of the FDOT planning level method for estimating TTR in the Strategic Intermodal System (SIS)
- Overview of the HCM operations level method for estimating TTR for specific freeway sections

# TT Distribution and TTR Measures

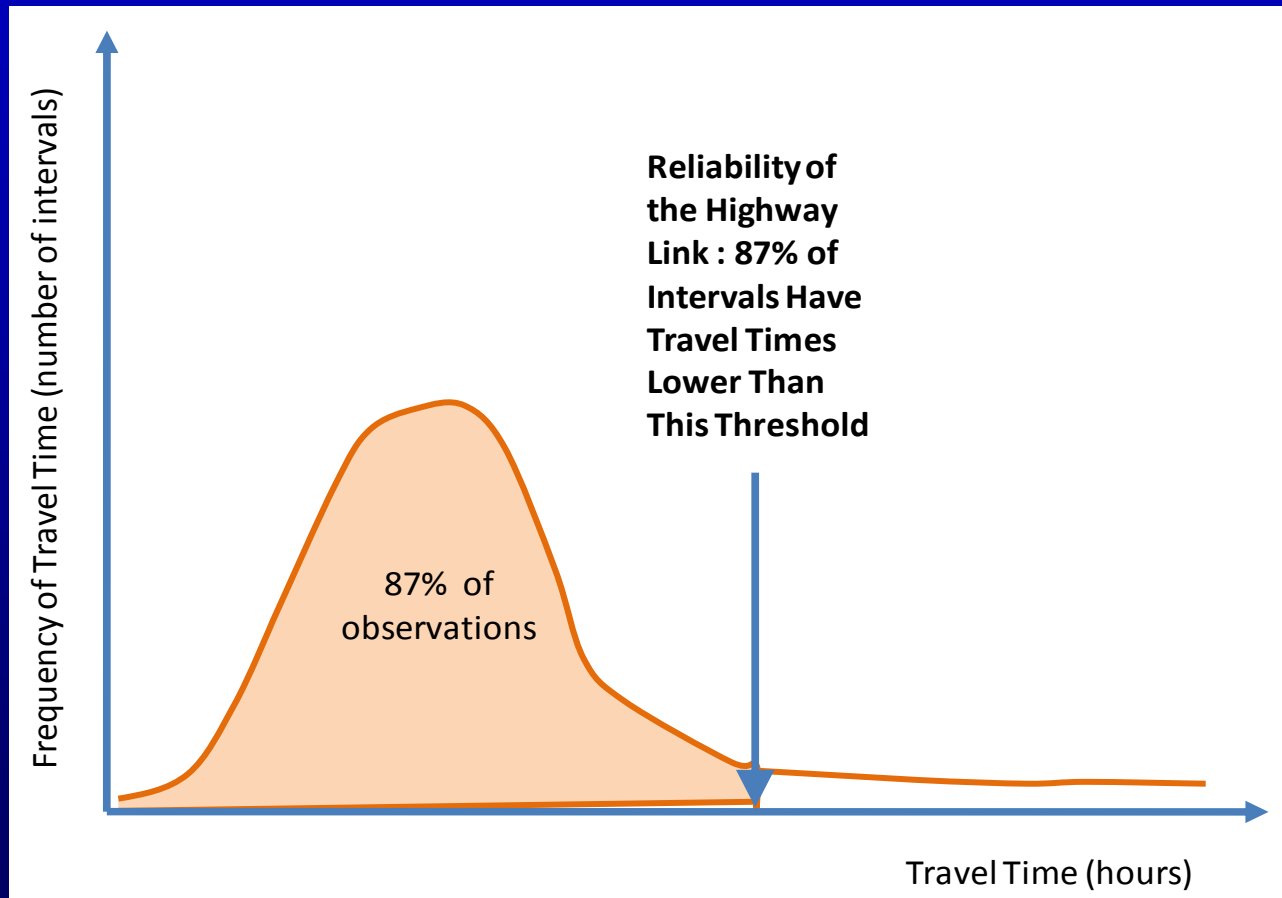
**Daily operations vary widely**  
(incidents, work zones,  
special events, demand  
variations, weather, etc.)

Analysis of a **single day** does  
not capture the “big picture”

**Travel time distribution**  
over a year can provide a  
better assessment  
considering a broader set  
of conditions



# Another Measure: TTR as a Percent of On-time Arrivals



# TTR Estimation Methods

- TTR estimation methods allow us to evaluate various policies and their impact on operations
- Typically, TT distribution is obtained, and various measures are extracted
- Methods currently available:
  - FDOT planning level analysis
  - HCM operations level analysis

# The FDOT Planning Level Method

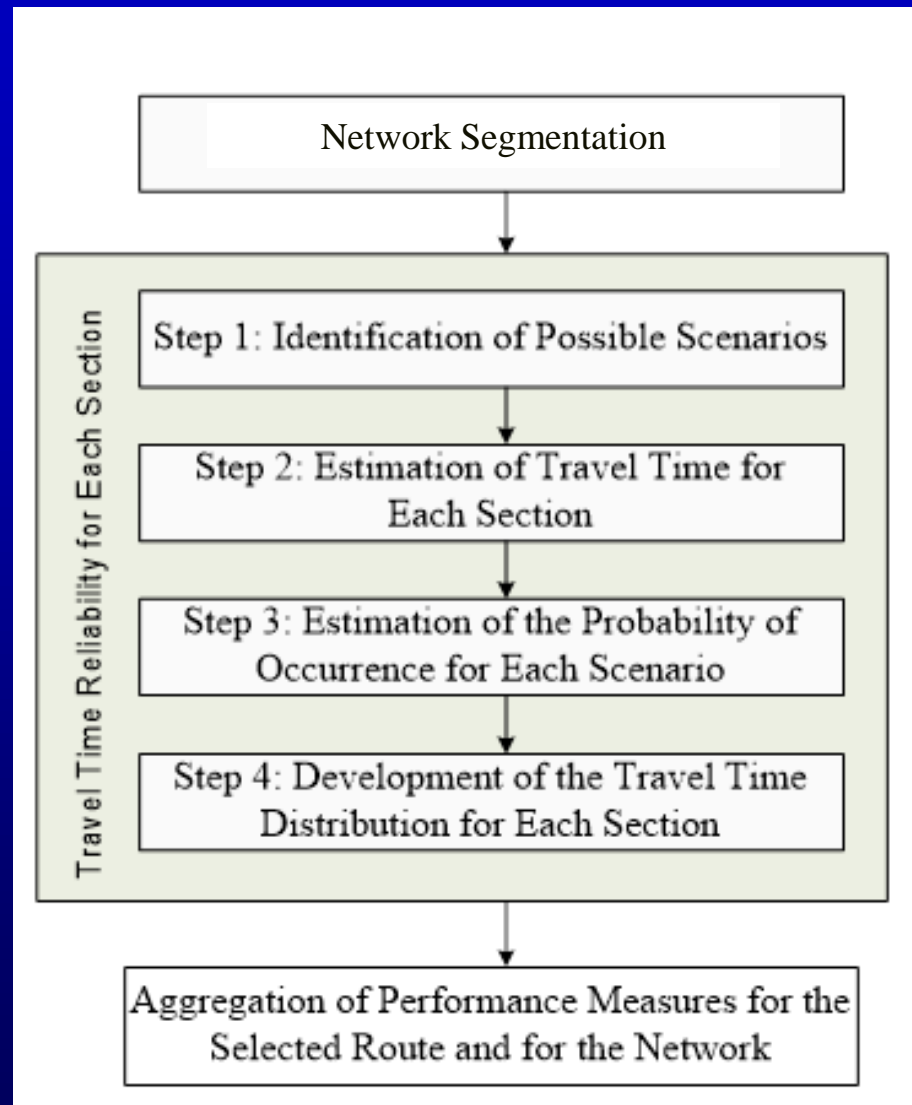
**Scenarios:** rain, incident closures, demands, work zones

**Travel time estimation models** used for each scenario

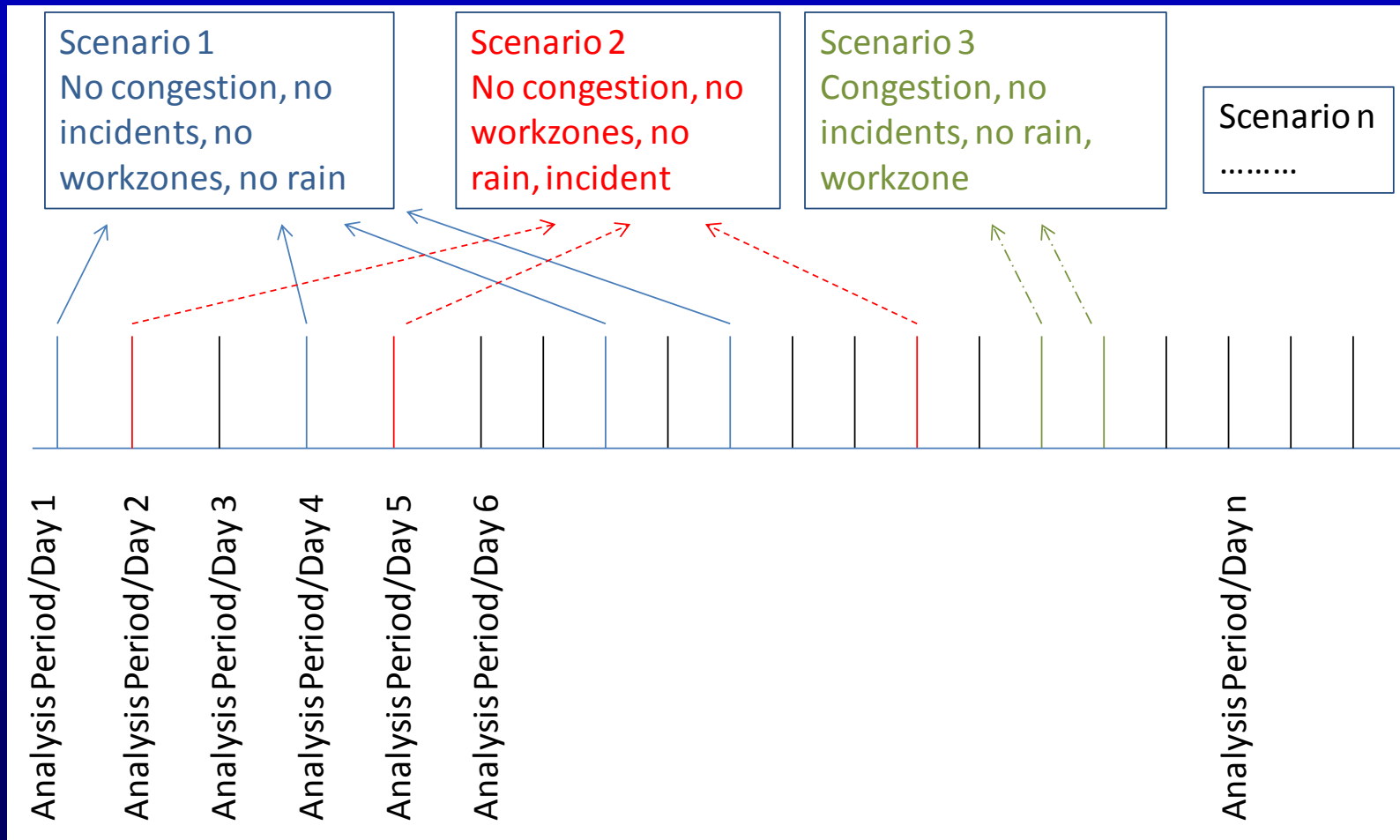
**Field data or default values** used to estimate the probability of occurrence for each scenario.

**Various performance measures** obtained for each section, and these are aggregated for the entire network.

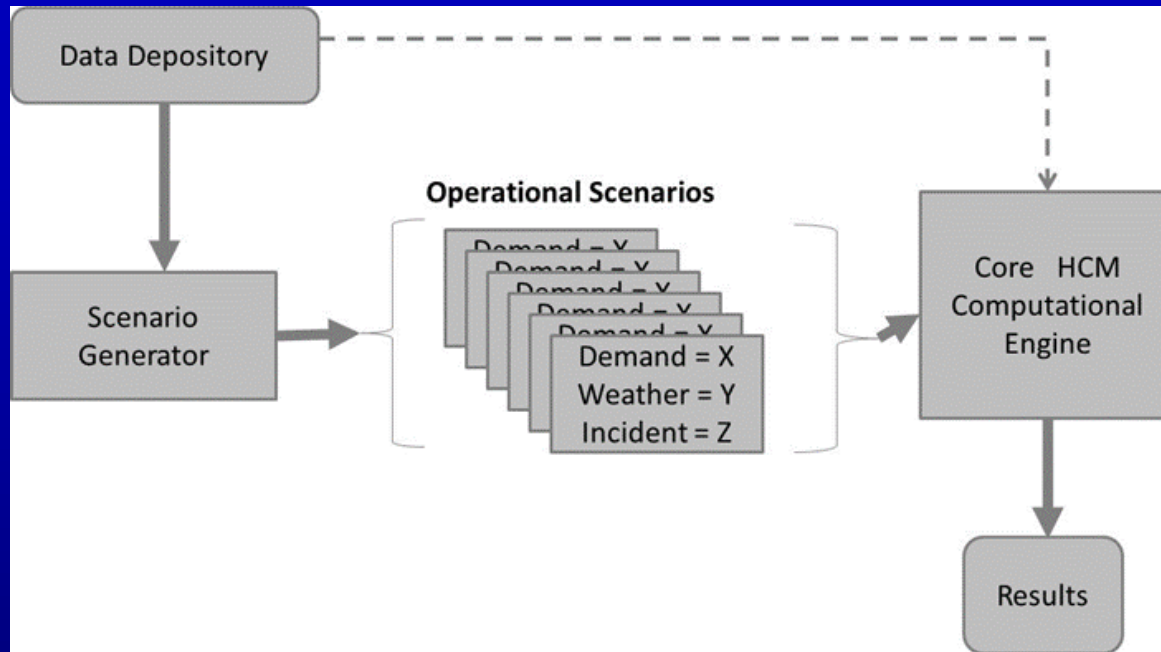
Estimates obtained for **freeways and arterials**



# Example Scenarios



# The HCM Operations Level Method



The main difference between this method and the FDOT planning level method is that in the HCM method there are **hundreds or thousands of scenarios** generated and analyzed



# Data Requirements for HCM Analysis

Data Category	Freeways	Urban Streets
Time periods	Analysis period, study period, reliability reporting period.	Analysis period, study period, reliability reporting period.
Demand patterns	Day-of-week by month-of-year demand factors relative to AADT. Can be defaulted.	Hour-of-day ( $K$ ) factors, day-of-week and month-of-year demand factors relative to AADT. Demand change due to rain and snow. Can be defaulted.
Weather	Probabilities of various intensities of rain, snow, cold, and low visibility by month. Can be defaulted.	Rain, snow, and temperature data by month. Pavement runoff duration for a snow event. Can be defaulted.
Incidents	Probabilities of occurrence of shoulder and lane closures and average durations. Alternatively, crash rate and incident-to-crash ratio for the facility.	Probabilities of specific crash and incident types by location. Alternatively, segment and intersection crash frequencies. Crash frequency adjustment factors. Factors influencing incident duration.
Work zones and special events	Changes to base conditions (alternative dataset) and schedule.	Changes to base conditions (alternative dataset) and schedule.
Nearest city	Required when defaulted weather data used.	Required when defaulted weather data used.
Geometrics	N/A	Presence of shoulder.
Traffic counts	N/A	Day and time of traffic counts used in base and alternative datasets.
Functional class	N/A	Urban street functional class required when defaulted demand patterns used.

Note: N/A = not applicable.

# Example Applications for Each Method

- FDOT planning method
  - What will be the system-wide impact if we modify the hours Road Rangers are operational?
  - How will TTR be impacted if we decrease the frequency of work zones during peak hours?
- HCM operations method
  - How much of a benefit would a lane addition have on TTR for this freeway section?
  - What is the anticipated impact of a change in signal control timings on TTR for this arterial section?

# Conclusions

- TT distributions and TTR measures are very useful in evaluating traffic operational quality over a long period of time and considering a wide variety of conditions
- Two different methods are currently available depending on the level of analysis.
  - FDOT planning level analysis
  - HCM operations level analysis

# Questions and Comments



Thank You!